10th Class 2019

Chemistry	Group-I	Paper-II
Time: 1.45 Hours	(Subjective Type)	Marks: 48

(Part-I)

2. Write short answers to any FIVE (5) questions: 10

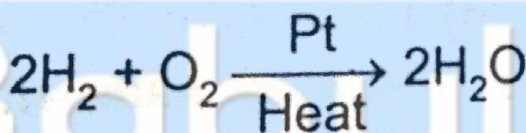
(i) What is meant by the term "Chemical equilibrium state"?

Ans When the rate of forward reaction takes place at the rate of reverse reaction, the composition of the reaction mixture remains constant, it is called a chemical equilibrium state.

(ii) Define irreversible reaction. Give an example

Ans Most of the reactions, in which the products do not recombine to form reactants, are called irreversible reactions. They are supposed to complete and are represented by putting a single arrow (→) between the reactants and products.

Example:

$$2H_2 + O_2 \xrightarrow[\text{Heat}]{\text{Pt}} 2H_2O$$

(iii) What do you mean by the extent of reaction?

Ans Numerical value of the equilibrium constant predicts the extent of a reaction. It indicates to which extent reactants are converted to products. In fact, it measures how far a reaction proceeds before establishing equilibrium state.

(iv) Write down two macroscopic characteristics of forward reaction.

Ans Following are two macroscopic characteristics of forward reaction:

1. It is a reaction in which reactants react to form products.

2. It takes place from left to right.

(v) **Why H^+ ion acts as a Lewis acid?**

Ans H^+ ion acts as a Lewis acid because it has empty orbital that can accommodate a pair of electron.

(vi) **Define pH. What is the pH of pure water?**

Ans pH is the negative logarithm of molar concentration of the hydrogen ions, *i.e.*, $pH = -\log [H^+]$.

The pH value of pure water is 7.

(vii) **Write the name and formulae of two mineral acids.**

Ans Two numerical acids are:

1. Hydrochloric Acid (HCl)
2. Sulphuric Acid (H_2SO_4)

(viii) **Differentiate between conjugate acid and conjugate base.**

Ans A conjugate acid is a specie formed by accepting a proton by a base. While a conjugate base is a specie formed by donating a proton by an acid.

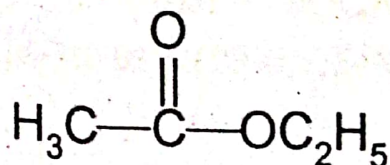
3. Write short answers to any FIVE (5) questions: 10

(i) **What is meant by isomerism?**

Ans The reason for the abundance of organic compounds is the phenomenon of isomerism.

(ii) **What is an ester group? Write down the formula of ethyl acetate.**

Ans Organic compounds consisting of RCOOR′ functional group, are called esters. Their general formula is $R-\overset{\overset{\displaystyle O}{\|}}{C}-OR'$, where R and R′ are alkyl groups. The formula of ethyl acetate is

$$H_3C-\overset{\overset{\displaystyle O}{\|}}{C}-OC_2H_5$$

Ethyl acetate

(iii) **Write any two uses of organic compounds.**

Ans **1. Uses of Food:**

The food we eat daily such as milk, eggs, meat, vegetables, etc., contain carbohydrates, proteins, fats, vitamins, etc., are all organic stuff.

2. Uses of Clothing:

All types of clothing (we wear, we use as bed sheets etc.) are made up of natural fibres (cotton, silk and wool, etc.) and synthetic fibres (nylon, dacron and acrylic, etc.) all these are organic compounds.

(iv) **Why are the alkenes called olefins?**

Ans Alkenes are called olefins because first members form oily products when react with halogens.

(v) **Differentiate between saturated and unsaturated hydrocarbons.**

Ans **Saturated Hydrocarbons:**

The hydrocarbons in which all the four valencies of carbon atoms are fully satisfied (saturated) by single bonds with other carbon atoms and hydrogen atoms are called saturated hydrocarbons. Saturated hydrocarbons are also called **alkanes**.

Unsaturated Hydrocarbons:

The hydrocarbons in which two carbon atoms are linked by a double bond or a triple are called unsaturated hydrocarbons.

(vi) **Write two characteristics of monosaccharides.**

Ans Following are the two characteristics of monosaccharides:

1. They are soluble in water and have sweet taste.
2. They cannot be hydrolyzed.

(vii) **Write two points of importance of vitamins.**

Ans Vitamin plays an important role in the healthy development of our body. Natural vitamins are organic food substances found only in plants and animals. Vitamin

cannot be assimilated without ingesting food. That is why, it is suggested that vitamins must be taken with meal.

(viii) What is the function of DNA?

Ans The function of the double helix formation of DNA is to ensure that no disorder takes place. DNA carries genes that controls the synthesis of RNA. Errors introduced into the genes synthesize faulty RNA. It synthesizes faulty protein that do not function the way they are supposed to. This disorder causes genetic diseases.

4. Write short answers to any FIVE (5) questions: 10

(i) Write down the name of stratosphere's regions.

Ans The names of stratosphere's regions are:

1. Upper stratosphere (Ozone decomposition region).
2. Middle stratosphere (Ozone formation region).
3. Lower stratosphere.

(ii) Write down two effects of SO_2.

Ans Following are the two effects of SO_2:

(a) SO_2 is a colourless gas having irritating smell. It causes suffocation, irritation and severe respiratory problems to asthmatic people.

(b) SO_2 forms sulphuric acid which damages buildings and vegetations.

(iii) Differentiate between primary and secondary air pollutants.

Ans Primary air pollutants are the waste products driven out because of the combustion of fossil fuels and organic matter *e.g.*, SO_2, SO_3, CO_2, CO, etc.

While secondary pollutants are produced by various reactions of primary pollutants *e.g.*, sulphuric acid, nitric acid, etc.

(iv) What is jaundice? Give its symptoms.

Ans Jaundice is caused by an excess of bile pigments in the blood.

Symptoms:

Liver ceases to function and eyes turn yellow. Patient feels weakness and fatigue.

(v) Write down two properties of water.

Ans Following are the two properties of water:

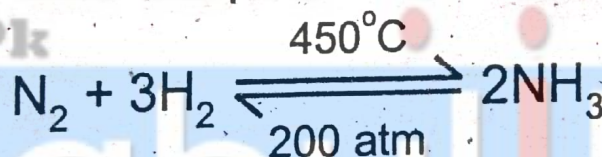
1. The freezing point of water is $0^{\circ}C$ and boiling point is $100^{\circ}C$ at sea level.
2. Its maximum density is $1 g\ cm^{-3}$ at $4^{\circ}C$.

(vi) What is meant by minerals?

Ans The solid natural materials found beneath the Earth's surface, which contains compounds of metals in the combined state along with earthly impurities, are called minerals.

(vii) How is ammonia prepared for the synthesis of urea?

Ans Ammonia is prepared by the "Haeber's process". One volume of nitrogen (from air) and three volumes of hydrogen (obtained by passing methane and steam over heated nickel catalyst) is passed over iron catalyst at 450°C and 200 atm pressure.

$$N_2 + 3H_2 \underset{200\ atm}{\overset{450^{\circ}C}{\rightleftharpoons}} 2NH_3$$

(viii) Write down the two uses of petroleum ether.

Ans Following are the two uses of petroleum ether:

1. It uses as laboratory solvent.
2. It uses for dry cleaning purposes.

(Part-II)

NOTE: Attempt any TWO (2) questions.

Q.5.(a) How the direction of a reaction can be predicted by the numeric value of equilibrium constant? (5)

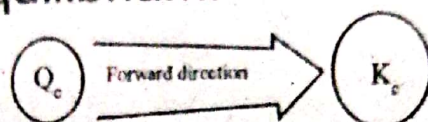
Ans Knowing the numerical value of equilibrium constant of a chemical reaction, direction of the reaction can be predicted.

Predicting Direction of a Reaction:

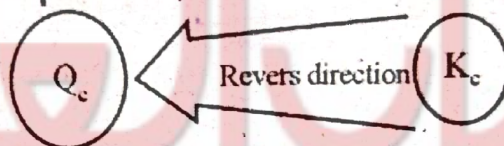
Direction of a reaction at a particular moment can be predicted by inserting the concentration of the reactants and products at that particular moment in the equilibrium expression. We can make the following generalization about the direction of the reaction.

If $Q_c < K_c$

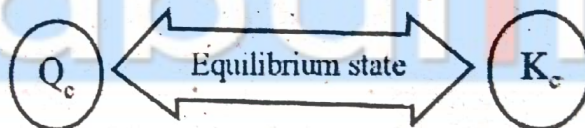
The reaction goes from left to right, *i.e.*, in forward direction to attain equilibrium.

Q_c → Forward direction → K_c

If $Q_c > K_c$

The reaction goes from right to left, *i.e.*, in reverse direction to attain equilibrium.

Q_c ← Revers direction ← K_c

If $Q_c = K_c$

Forward and reverse reactions take place at equal rates, *i.e.*, equilibrium has been attained.

Q_c ↔ Equilibrium state ↔ K_c

(b) Write the concept of Bronsted Lowry about acids and bases. Give examples. (4)

Ans **Bronsted-Lowry Concept:**

In 1923, the Danish chemist Bronsted and the English chemist Lowry independently presented their theories of acids and bases on the basis of proton-transfer. According to this concept:

Acid:

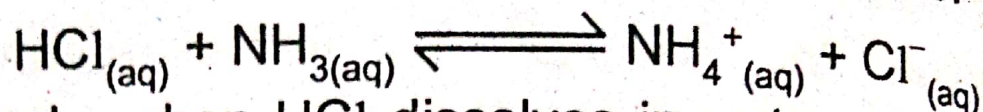
An acid is a substance (molecule or ion) that can donate a proton (H^+) to another substance.

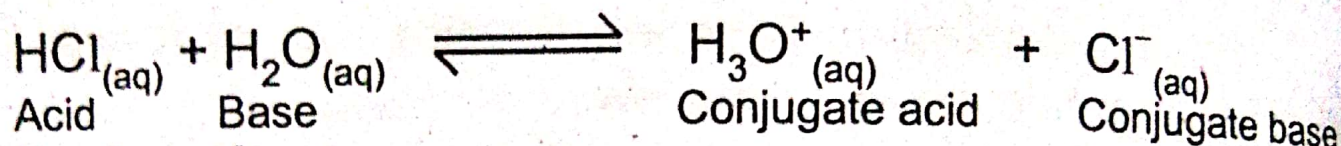
Base:

A base is a substance that can accept a proton (H^+) from another substance.

Examples:

HCl acts as an acid while NH_3 acts as a base:

$$HCl_{(aq)} + NH_{3(aq)} \rightleftharpoons NH_4^+{}_{(aq)} + Cl^-{}_{(aq)}$$

Similarly, when HCl dissolves in water; HCl acts as an acid and H_2O as a base.

$$\underset{\text{Acid}}{HCl_{(aq)}} + \underset{\text{Base}}{H_2O_{(aq)}} \rightleftharpoons \underset{\text{Conjugate acid}}{H_3O^+{}_{(aq)}} + \underset{\text{Conjugate base}}{Cl^-{}_{(aq)}}$$

Explanation:

It is a reversible reaction. In the forward reaction, HCl is an acid as it donates a proton, whereas H_2O is a base as it accepts a proton. In the reverse reaction, Cl^- ion is a base as it accepts a proton from acid H_3O^+ ion. Cl^- ion is called a conjugate base of acid HCl and H_3O^+ ion is called a conjugate acid of base H_2O. It means every acid produces a conjugate base and every base produces a conjugate acid such that there is conjugate acid-base pair. Conjugate means joined together as a pair.

Conjugate Acid:

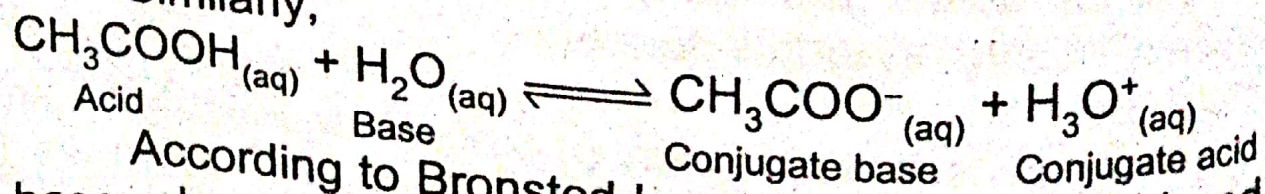
A conjugate acid is a specie formed by accepting a proton by a base.

Conjugate Base:

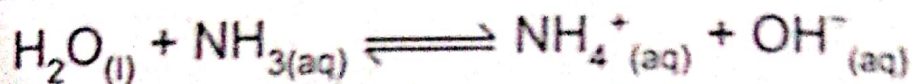
A conjugate base is a specie formed by donating a proton by an acid.

Thus, conjugate acid-base pair differs from one another only by a single proton.

Similarly,

$$\underset{\text{Acid}}{CH_3COOH_{(aq)}} + \underset{\text{Base}}{H_2O_{(aq)}} \rightleftharpoons \underset{\text{Conjugate base}}{CH_3COO^-{}_{(aq)}} + \underset{\text{Conjugate acid}}{H_3O^+{}_{(aq)}}$$

According to Bronsted-Lowry concept, an acid and a base always work together to transfer a proton. That

means, a substance can act as an acid (proton donor) only when another substance simultaneously behaves as a base (proton acceptor). Hence, a substance can act as an acid as well as a base, depending upon the nature of the other substance. For example, H_2O acts as a base when it reacts with HCl as stated above and as an acid when it reacts with ammonia such as:

$$H_2O_{(l)} + NH_{3(aq)} \rightleftharpoons NH_4^+{}_{(aq)} + OH^-{}_{(aq)}$$

Such a substance that can behave as an acid, as well as, a base is called amphoteric.

It has been observed that there are certain substances which behave as acids though they do not have the ability to donate a proton, *e.g.*, SO_3. Similarly, CaO behaves as a base but it cannot accept a proton. These observations prove the limitations of Bronsted-Lowry concept of acids and bases.

Q.6.(a) Write any five uses of ethene. (5)

Ans For Answer see Paper 2017 (Group-II), Q.6.(a).

(b) Explain any four sources of lipids. (4)

Ans Following are the four sources of lipids:

(i) Animal fats are found in adipose tissue cells. Animals secrete milk from which butter and ghee is obtained. Butter and ghee are used for cooking and frying of food, for preparing bakery products and sweets.

(ii) Animal fats are used in soap industry.

(iii) Plants synthesize oils and store them in seeds, such as sunflower oil, coconut oil, groundnut oil and corn oil. These oils are used as vegetable oils or ghee for cooking and other purposes.

(iv) Marine animals like salmon and whales are also source of oils. These oils are used as medicines, e.g., cod liver oil.

Q.7.(a) Write down five advantages of Solvay's Process. (5)

Ans Following are five advantages of Solvay's process:

(i) It is a cheap process as raw materials are available at very low prices.

(ii) Carbon dioxide and ammonia are recovered and reused.

(iii) Process is pollution-free, because the only waste is calcium chloride solution.

(iv) Sodium carbonate of very high purity is obtained.

(v) Consumption of fuel is very less since no solution is to be evaporated.

(b) Describe two methods for the removal of permanent hardness of water. (4)

Ans For Answer see Paper 2016 (Group-II), Q.8.(a).